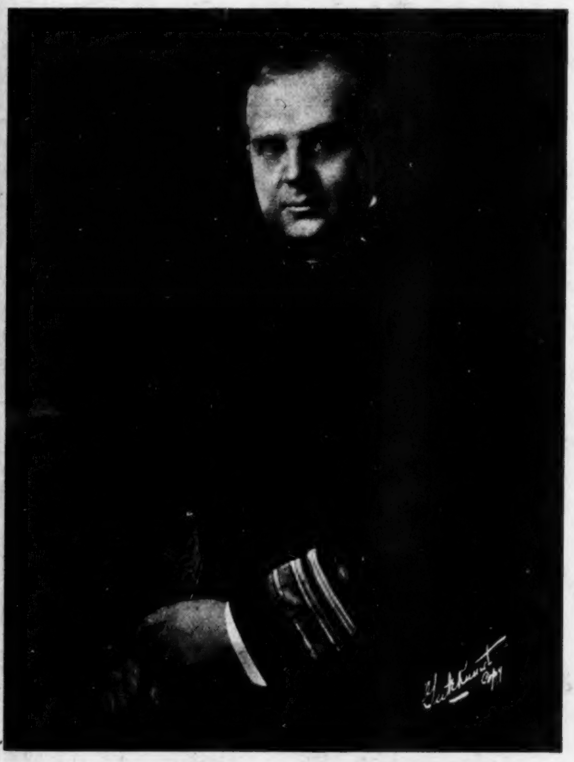
# AMERICAN JOURNAL OF PHARMACY

and

## THE SCIENCES SUPPORTING PUBLIC HEALTH

SINCE 1825



ADMIRAL WILLIAM C. BRAISTED

1864 — 1941

FEBRUARY
1941

# The Philadelphia College of Pharmacy and Science

1821 - 1941

One Hundred Twenty Years
of
Education
in
Pharmacy
and the
Sciences Allied to Public Health

# AMERICAN JOURNAL OF PHARMACY
## AND THE SCIENCES SUPPORTING PUBLIC HEALTH

Since 1825





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## CONTENTS




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## WILLIAM C. BRAISTED, M. D.

REAR ADMIRAL BRAISTED was the tenth president of the Philadelphia College of Pharmacy and Science, serving from 1921 until 1927.

Born in Toledo, Ohio, in 1864, he obtained his undergraduate education at the University of Michigan, and his medical education at Columbia University, where he was an honor man in his class.

In 1890 he entered the Navy as Assistant Surgeon, and his career in his country's service was one of intense application to study and rapid rise in rank. His orders placed him on a number of vessels and at many naval hospitals. He saw action at the battle of Puerto Cabello. He fitted out and equipped the hospital ship "Relief."

Dr. Braisted represented the Navy Department in Japan, and he also served as attending physician at the White House during President Theodore Roosevelt's administration.

During the World War he assumed many responsibilities and administered the medical service to 120,000 sick and wounded soldiers, sailors and marines. In recognition of the magnitude of his work, he was awarded the Distinguished Service Medal of the Navy. In addition, honorary degrees were granted him by the University of Michigan, Jefferson Medical College and Northwestern University.

During his presidency of the Philadelphia College of Pharmacy and Science, he guided the movement to bring the institution from its outmoded building on North Tenth Street to its modern, new quarters in West Philadelphia.

His death, on January 17, 1941, removed from this life one of the foremost proponents of modern pharmaceutical education and naval medical practice.

# E D I T O R I A L

**On these pages the editor offers his opinions, unshackled by advertising patrons and unrestrained by anything save a sense of the decent and the truthful. The editor, alone, is responsible for their type, their tone and their tenor.**

## WHAT IS EDUCATION?

ADDISON refers to education, decrying the dormant village Hampdens, yet striking a grand keynote in the very first phrase: "What sculpture is to a block of marble, education is to the human soul. The philosopher, the saint, the hero, the sage, and the good, or the great, very often lie hid and concealed in a plebeian, which a proper education might have disinterred and brought to light."

John Ruskin believed that "Education does not mean teaching people to know what they do not know; it means teaching them to behave as they do not behave"; and although that definition is ruskinly and riskily ambiguous, and its doctrine even more Nazi than naïve, it does carry a challenge to every thinking person.

From a long ago copy of the *Princeton Review,* contemporary with Woodrow Wilson's academic presidency, we quote: "Education is NOT learning; it is the exercise and development of the powers of the mind; and the two great methods by which this end may be accomplished are in the halls of learning and in the conflicts of life."

From elsewhere we quote:

"Education is that flawless method through whose exercise man is imbued with a sense of duty and with a consciousness of his capabilities, when, holding both as vivid trusts, he becomes, through service and through sweat, a happiness to himself and a benediction to his brothers."

Again:

"I like that kind of an education which subscribes to the old-fashioned notion that a lad best keens his wits on difficulties and which considers the mind not as an ornamental set of idle tools but as an array of useful, useable instruments, tuned and tempered to familiar tasks, but also to the new and unfamiliar, meeting these as they come, and solving them, with applied intelligence and plastic adaptability."

Then there is this thought-provoking reaction:

"Education is three dimensional, for he who is properly educated must have a balanced, well-rounded knowledge of things as they are, a happy familiarity with things as they were, and beyond all, a dream of things as they might be."

Best of all, however, is Thomas J. Huxley's immortal opinion of the liberally educated man:

"That man, I think, has had a liberal education who has been so trained in youth that his body is the ready servant of his will, and does with ease and pleasure all the work that, as a mechanism, it is capable of; whose intellect is a clear, cold, logic engine, with all its parts of equal strength, and in smooth working order; ready like a steam engine to be turned to any kind of work, and spin the gossamers as well as forge the anchors of the mind; whose mind is stored with a knowledge of the great and fundamental truths of nature and of the laws of her operations; one who, no stunted ascetic, is full of life and fire, but whose passions are trained to come to heel by a vigorous will, the servant of a tender conscience; who has learned to love all beauty, whether of nature or of art, to hate all vileness, and to respect others as himself."

And I can well believe that such a man might show a state of heart and mind and life kindred to that so well portrayed in Channing's lovely symphonic prayer:

"To live content, with small means; to seek elegance rather than luxury; and refinement rather than fashion; to be worthy, not respectable; and wealthy, not rich; to study hard, think quietly, talk gently, act frankly; to listen to stars and birds, to babes and sages with open heart; to hear all cheerfully, do all bravely, await occasions, hurry never.

In a word, to let the spiritual unhidden and unconscious grow up through the common.

This is to be my symphony."

Ivor Griffith.

# A REVIEW OF THE BOTANICIAL DRUG SITUATION IN THE UNITED STATES*

By Frank H. Eby

**We are again faced with a situation comparable to that in 1915 when, due to war conditions, the supply of certain crude drugs was drastically reduced. Our position is somewhat better, since we do have the necessary knowledge of climate and soil conditions to grow many of these medicinal plants domestically. A general survey of the possibilities of such collection and cultivation at home is given by one who is quite familiar with this most important subject.**

FOR some time the pharmaceutical and related professions and industries have been feeling the effects of wars in various parts of the world and there is a growing concern regarding the future supplies of crude botanical drugs, oils, alkaloids and other products derived from foreign grown plants.

Since so many of the crude drug producing areas of the world are now involved in war or preparation for it, it is impossible to portray a complete picture of the crude drug situation. Under normal conditions we can predict with some degree of accuracy, crop and market conditions for some months in advance, as things are at present, however, we can not predict the possible state of the crude drug market for next week.

In this paper I shall attempt to mention some of the more important facts relating to our natural drug resources and touch on the possibility of future production of botanical drugs and some of the commercially important products derived from plants.

I believe most of you know that the United States produces only a limited quantity of all the important botanicals used in this country. It is true that we produce many botanicals and some of these in large quantities, but many of the most important and widely used drugs are derived from foreign sources.

The collection of botanicals in America for medicinal purposes dates back to the early colonial days. Not only were the native American plants used but many herbs were introduced from the homelands of the early settlers. These botanical drugs played an important part in American medicine for many years and even up to twenty-five years ago, many of these enjoyed great popularity both with the medicinal profession and the public. Because the sale of

*Presented before the Philadelphia Branch, American Pharmaceutical Association, Philadelphia, Pa., January 14, 1941.

botanical drugs in their crude form has decreased in drug stores in recent years, we may think that these drugs have almost passed out of the pharmaceutical picture—however when we study commerce reports and note the quantities of crude drugs purchased by the larger pharmaceutical manufacturers, we must conclude that the crude drug industry as a whole in the United States is a very important one.

It is estimated that more than 250 different botanical drugs are derived from plants which grow in the United States. Some of these are of little importance and their annual yield is quite limited; some are of enormous importance and productions are sufficient to permit exportation. This large number of botanicals does not lessen our dependence on foreign grown botanicals and possibly we shall experience a situation similar to or even more serious than that which occurred during and after the first world war.

Twenty-five years ago the war and its economic involvements were centered in Europe primarily—today wars involve not only Europe but important areas in Asia and Africa. The situation is so serious that even though the several wars should end within the next three months, we can be sure of a serious shortage of many of our important crude drugs.

In 1915 when evidence of a shortage of botanical drugs was well established, the cultivation of medicinal plants began on a fairly large scale in various parts of the country. Digitalis, Belladonna, Hyoscyamus, Cannabis, Sage and a few others were among the medicinal plants cultivated most successfully. With the restoration of trade with the European countries following the end of the first world war, the cultivation of medicinal plants was largely discontinued in the United States with the exception of Digitalis, and to a limited extent Belladonna.

It is generally agreed that the United States has suitable soil, climate and other conditions necessary for the cultivation of numerous medicinal plants, however labor and other operating expenses have been too high in general to compete with other countries where production costs are very low. Other factors in some instances have retarded or prevented the cultivation of some medicinal plants on a large scale.

Today we are in a more favorable position than we were during the first world war. We have a much better knowledge of our own medicinal plant resources and experimental studies have demon-

strated that we have the facilities for cultivating many plants which are normally cultivated almost exclusively in foreign lands.

In 1937 the Committee on Pharmacognosy and Pharmaceutical Botany of the National Research Council published the first results of a survey entitled "A Survey of the Wild Medicinal Plants of the United States, Their Distribution and Abundance." The primary purpose of the survey is to record in an authentic manner the number of medicinal plant species and the quantity of each in every county, in every state, so that in times when an economic emergency exists, we may have an accurate and comprehensive record of our natural plant resources.

The survey just mentioned includes about 161 species and surveys have been completed or partially completed in fourteen states, chiefly located east of the Mississippi.

Certainly with our great wealth of medicinal plants, we should know what is available and where worthwhile quantities can be obtained. We should also make some effort at preserving species in danger of extinction due to ruthless collecting methods.

Since Colonial days the Appalachian Mountains, extending through several eastern states, have been the chief source of most of our native botanical drugs. Today the domestic crude drug industry centers in the western part of North Carolina and the neighboring Blue Ridge country. Here most of the collecting is carried on by the native mountain inhabitants, who, in spite of rather crude methods in some instances, have developed the collection of crude drugs into a great industry. Annually in the Blue Ridge region within a distance of 150 miles of Asheville, N. C., tons of Sassafras, Wild Cherry, Elm, Pine Bark, Podophyllum, Gelsemium, the Viburnums and many other botanicals are collected. Although several native plants such as Hydrastis and Ginseng have almost disappeared from this region, there appears to be an abundance of the most important medicinal plants and no shortage of crude drugs is anticipated in the near future.

Farther south in Georgia and Florida is located the Turpentine industry, one of the largest and most important ones in the United States. The importance of this industry is well known to all.

The Cascara Sagrada industry, located chiefly in the states of Oregon and Washington, is one of the most important crude drug industries in the United States. Cascara Sagrada trees are native to our Pacific Northwest and the neighboring Canadian region and are

not native to any other region in the world. The collection of Cascara Sagrada bark has been carried on at an enormous rate for many years and by some it is claimed that we may expect a Cascara shortage some time in the not too distant future. Only small scale planting of Cascara trees is reported which is a typical example of American neglect of forest trees.

The collection of many botanical drugs is not limited to specific regions such as have just been mentioned. In fact almost every state in the union supplies one or more of the many botanicals which are collected in varying quantities. With the exception of Cascara, Berberis, some Digitalis and a few other drugs, much of the collection from native plants is localized in the eastern states.

A review of the literature reveals numerous studies which have been conducted on the therapeutic properties and chemical composition of many native American plants. Most of the studies have been made with the idea of locating new therapeutic agents or new sources of important chemical products. Some plants appear to have valuable potential properties; others show no promise either as therapeutic agents or sources of important chemical products.

Too few American botanicals have been studied thoroughly, even many of those which are used extensively have been studied only superficially. I believe no drugs hold more possibilities as useful remedies, yet only thorough studies can prove this.

In addition to the numerous species of wild plants which are utilized commercially, there are many medicinal plant products collected for home consumption although this is not the common practice it was twenty-five years ago. There are also some important wild plants such as Digitalis, which grows in large quantities in Oregon, and Hyoscyamus found commonly in Montana, which have not been exploited very extensively. These are good sources of valuable drugs which may be used in the near future.

When we consider the cultivation of medicinal plants on a commercial scale there is much to be done experimentally. For reasons which man is frequently unable to explain, nature in many instances seems to show a selective hospitality to many plants, which accounts for the reason that some plants thrive well in one place but will not thrive equally well in another place, although conditions may appear to be identical. We can bring to America the seeds of plants which thrive in Europe and under conditions of cultivation which appear to be identical with those of Europe, we may get satisfactory plant

growth but there may be a marked difference in the percentage yield of the chief component, or there may be a decided difference in the chemical composition of the important constituent or constituents. Horticulturists and other plant workers, especially those who have worked with medicinal plants and the essential oil bearing plants, know that important changes may be expected in some plants when they are introduced into a new environment but there is nothing they can do about it. For example the quality of Oil of Bergamot produced in Southern Italy can not be exactly duplicated when produced in other parts of the world, and this seems to be equally true of other essential oils.

Both Richard Hudnut and G. A. Pfieffer, some years ago, experimented here in the United States with the cultivation of European species of essential oil bearing plants but none of their experiments met with much success and they abandoned their work in this field. They reported that in most instances the plants developed in a satisfactory manner but the yield of oil was not high and the oil was not suitable for perfume purposes. These early studies conducted both in Oregon and California seemed to indicate that there was some unknown factor, possibly climatic, which was responsible for the failure to produce perfume oils of a satisfactory character.

In times of an emergency such as exists at present, the public always shows great interest in the cultivation of medicinal plants. They seem to feel they can derive a large income from the cultivation of a few acres of some medicinal plants and at the same time contribute to man's welfare. Frequently the public press publishes misleading statements in pointing out great opportunities for farmers and others who grow medicinal plants. Very little attention is given to the problems which will naturally confront those who engage in this work, certainly no job for an amateur and one which may tax the ingenuity of an experienced farmer.

While it is true that very substantial financial returns have been derived from the cultivation of medicinal plants during times when there have been marked shortages with corresponding high prices, generally speaking, the returns from many medicinal plant crops are no better than those derived from ordinary farm or garden crops.

These statements are not made to discourage those who wish to engage in this occupation, but rather to point out that no great wealth can be derived by simple and easy methods in the new ad-

venture of growing medicinal plants. It is a venture which past experiences have shown is not always a successful one.

Government authorities recommend that careful studies of all factors be made before any work at actual cultivation is started. Definite knowledge regarding soil and climatic requirements; methods and time of harvesting, drying and storing, and most important of all, is how and where to dispose of the crop. All of these are factors, somewhat like those encountered by the average farmer, yet different enough to warrant a thorough understanding of their importance.

The Bureau of Plant Industry, United States Department of Agriculture, highly recommends the cultivation of medicinal plants for regions where such cultivation is likely to meet with success under ordinary conditions. This bureau has initiated many studies in this field and for a number of years has carried on an extensive experimental program at the government gardens at Arlington and at various stations in other parts of the United States. Much of the valuable information that is available today on medicinal plant cultivation has been derived as a result of studies conducted by this bureau. If work on medicinal plant cultivation is anticipated this bureau should be consulted. The advice on what to cultivate and where to obtain seeds and stock is especially helpful.

Among the more important medicinal plants under cultivation in the United States, some to a very limited extent are: Digitalis, Hydrastis, Peppermint, Spearmint, Wormseed, the Mustards, Belladonna and a few others which will be mentioned briefly.

Digitalis has received the greatest attention of all the medicinal plants cultivated in the United States. During and immediately following the first world war, Digitalis was cultivated on a rather extensive scale. The H. K. Mulford Company at Glenolden and in several localities in Virginia and in other states, large quantities of Digitalis were produced annually for a few years but most of these projects were abandoned within several years after the war ended. Today the cultivation of Digitalis is not extensive. Parke, Davis & Company, Upsher Smith Company in Minneapolis and Sharpe & Dohme Company cultivate sufficient drug for their own use but the United States must import annually about 50,000 pounds. Studies reveal that the region near Minneapolis is well suited for Digitalis cultivation but other regions have produced it satisfactorily and I believe we shall see considerable interest displayed in the revival of this industry in the coming year.

Hydrastis cultivation is confined largely to the Pacific Northwest region at present. It is estimated that about 60 per cent. of the crop is cultivated in the Skagit Valley of Washington. There is also a considerable number of small farms engaged in the cultivation of both Hydrastis and Ginseng at Escatada, Oregon. The author visited this region several years ago and learned that Hydrastis cultivation is a rather expensive proposition with a none too certain market. Hydrastis must be grown in sheds having tops of lattice work to produce a partial shade, and facilities for irrigating the land must be provided in order to insure a moist woodland type of environment. From five to six years are required for the development of plants to obtain a good crop of commercially valuable roots and rhizomes.

The cultivation of peppermint is localized largely in southern Michigan and northern Indiana, where about 27,000 acres were cultivated in 1940. Oregon and Washington had about 3000 acres under cultivation and several hundred acres were grown in other states. Peppermint cultivation is not difficult and usually a good farm soil will produce a satisfactory crop. Although a considerable quantity of the dried herb is used in pharmacy, the great bulk of all peppermint produced is distilled for its oil, the yield of oil being about twenty-five pounds per acre.

Spearmint is cultivated in about the same manner as Peppermint and largely in the Michigan-Indiana area. Some Spearmint is cultivated in other states, and like Peppermint, most of the herb is distilled for the oil.

For many years the cultivation of Chenopodium or American Wormseed has been confined to a small region in Carroll County, Maryland. It is claimed that the oil derived from plants cultivated in this area is finer than that produced in any other part of the United States but for reasons which no one can explain. The limited demand for this oil has demoralized the industry somewhat in recent years.

Belladonna, although grown only on a small scale at present in the United States, was a very popular and quite profitable crop when it was cultivated extensively during and for a few years immediately following the first world war. The largest acreages were reported to be in Virginia, in New Jersey and in California. In the latter state more than one hundred acres were said to have been under cultivation at one time. In all it is estimated that about three

hundred acres of Belladonna were cultivated in 1918, the year when production reached its peak.

It may be of interest to know that Dr. John Borneman, well known homeopathic pharmacist of Philadelphia, has been cultivating his own Belladonna at Norwood, Pa., for some years. In addition to Belladonna he has under cultivation Aconite and many other medicinal plants, most of which he grows only on a limited scale for his own use.

Possibly the labor involved in its production and the fact that Belladonna does not winter well in this area accounts for the reason that its cultivation has been almost discontinued. Cheap Belladonna imported from Europe is the most important reason why most producers ceased growing it.

At present there is unusual interest in future cultivation of Belladonna here in the United States. Annual importations which average about 200,000 pounds of the leaves, have ceased and since we can expect few or no importations during the next year or possibly several years, it will be necessary for the United States to produce sufficient for domestic needs. Hence we can see that the Belladonna industry will be revived, possibly to a large extent this summer, if sufficient seeds can be obtained.

In recent years Mustard Seeds have been produced on an extensive scale in some of our western states. In several southern states Capsicum is being produced commercially but both the Mustards and Capsicum are being consumed largely in the food industries.

During the last several years Lavender, Rosemary and various other medicinal plants have been cultivated in New England as part of a WPA project. Headquarters for this work have been located in Durham, N. H.

Within the last twenty-five years various medicinal plants have been grown successfully. Stramonium has been cultivated in California and Minnesota but cultivation was discontinued because the returns were not profitable. Levant Wormseed, the source of Santonin, has been grown in Virginia and California and for the last several years has been grown on a small scale in Oregon. Sage has been grown successfully in New England where it is claimed a drug of fine quality can be produced. Sage has also been grown successfully in Michigan and Wisconsin. Henbane, Cannabis, Burdock and a few others of lesser importance have been cultivated on a small

scale but never over a long period of time, usually because of unsatisfactory financial returns.

We may mentioned Linseed as an important crop product on a large scale by western farmers. Most of the Linseed and its oil are not employed in the pharmaceutical industry but in various unrelated industries.

One of the most important crop plants in several of our western states, especially in the Mississippi valley, some thirty years ago was the castor plant cultivated for its seeds, the source of the very important castor oil. In 1879 Kansas is reported to have produced more than 700,000 bushels of seeds. Although the U. S. Department of Agriculture has made repeated efforts to interest farmers in the production of castor seeds, little interest has been shown by them and no castor seeds are being produced on a commercial scale today.

When we consider the medicinal plants which have been grown experimentally in the United States, we find a large number produced successfully in various parts of the country. Most of the plants studied are sources of important or widely used drugs. In most instances where successful cultivation has been reported no attention has been given to production costs since the most important consideration was to determine if crude drugs, of at least standard quality, could be produced. Many authorities feel that we can not compete with the producers of foreign grown drugs under normal conditions, however with present conditions we may be required to produce some of our drugs regardless of cost.

As early as 1912 extensive studies were conducted at the medicinal plant farm in Madison, Wisconsin. (1) The work was supported by a state grant and a number of acres of plants were cultivated. The project was abandoned some years ago because of the lack of sufficient funds to carry on the work, but while it was in operation it was certainly the largest and most successful venture of its kind in the United States.

During recent years considerable success has been reported in Florida where work has been conducted at the medicinal plant gardens of the University of Florida as well as in various places throughout the state. (2) The southern part of the state with its tropical climate seems to be especially suited for many drugs which are now produced only in tropical regions in various parts of the world. Squill, Ginger, Cajeput, Lemon Grass and Papaya have been produced successfully. In the southern part of the state Aloe is being produced on a small

commercial scale and it is believed possible that the production of this important drug could be stepped up to a considerable degree if economic conditions warrant it. At present we import well over a half million pounds of Aloe annually and frequently importations run much higher than this, hence it can be seen that there is some reason for developing this industry if production costs can be regulated. Camphor trees planted some years ago in Florida have grown satisfactorily but the production of synthetic camphor has destroyed the interest in the natural product. It has been demonstrated that Black Psyllium will grow well in Florida and there is a possibility of it being cultivated if the European shortage becomes serious.

In Texas extensive experimental studies have been conducted both with tropical and semi-tropical plants, especially in the Rio Grande Valley. The production of Senna is reported and only production costs appear to have prevented the development of Senna on a commercial scale. Texas Senna is claimed to have fine qualities which compare favorably with the best imported grades. Since the annual importations frequently total more than 2,000,000 pounds, the production of Senna could become commercially important although Senna is considered a very cheap drug.

Some twelve years ago the Bureau of Plant Industry started experimental studies on the cultivation of Ephedra species in the arid regions of Southwestern United States. These studies reveal that the Ephedra produces a good yield of Ephedrine.

In 1939 the report of studies conducted by Christensen revealed that Ephedra sinica could be produced economically in South Dakota. (3) The report indicates that soil and climatic factors were very satisfactory and that a good growth of plant material was obtained. Cultivation has not passed the experimental stages.

While not directly related to the drug industry, the cultivation of Insect Flowers has been attempted in much the same manner as many of the medicinal plants. Climatic factors seem to have an important bearing on the potency of the flowers and further studies will have to be carried on. Because of the great demand for Insect Flowers in the manufacture of insecticidal products the U. S. Department of Agriculture has been extremely interested in this activity.

Touching briefly on the botanical drugs which are derived only from foreign sources, we can say that conditions are serious at present and are approaching a more critical stage with each passing month. Already the stocks of many crude drugs are depleted and manu-

facturers of galenical preparations are limiting the sale of some important items.

More than a year ago one of our leading importers stated that the crude drug situation was rapidly approaching a stage when there would be a definite shortage of many important products. Even a year ago substandard Belladonna Leaves were reported, a condition which is not common in normal times.

While some shortage was anticipated a year ago, I believe most persons engaged in this field were of the opinion that the war in Europe could not continue for more than a few months and that the commerce in drugs would not be materially disrupted. Today we can be sure that the war will continue for some months and possibly years. I believe considerable cultivation of crude drugs would have been started last year and carried on this summer if present conditions could have been anticipated. This summer we will be certain to see some production but the extent of the production will depend on whether sufficient seeds can be secured for early plantings. To say the least, conditions in this line appear to be very uncertain at this time.

Among the more important crude drugs now subject to blockade are: Aconite, Althaea, Arnica Flowers, Belladonna Leaves and Root, Siam Benzoin, Bitter Apple, Buckthorn Berries and Bark, Caroway, Fennel, Chamomile Flowers, Colchicum Seed and Corm, Coriander, Hyoscyamus, Henna, Juniper Berries, Lycopodium, Manna, Opium, Alexandria Senna, Squill, Stramonium and Valerian. To this list may be added the following which may soon be withdrawn completely: Licorice Root, Acacia, Ephedra, Gentian, Quince Seed and Spanish Saffron. Of course there are many drugs of lesser importance not included in the above list.

Importations of volatile or essential oils, and to a lesser extent the fixed oils, play a very important part in the pharmaceutical, cosmetic and other industries. Many of the important oils are not being imported on account of the war and the effect is likely to be very serious, especially in the cosmetic industry. Some of the oils now subject to the blockade are Oils of Bitter Almond, Sweet Almond, Bergamot, Cod Liver, Celery, Caroway, Fennel, Juniper Berries, Lavender, Italian Lemon, Orange Flowers, some Pine Oils and Oil of Rose.

Annually we import in normal times more than $32,000,000 worth of essential oils and a shortage of some of the most widely

used oils has already stimulated great interest on the part of those who are interested in developing an American essential oil industry. Within the last several years the National Farm Chemurgic Council, distilleries, state and federal governments have shown great interest in the growing of essential oil bearing plants. Experimental studies conducted in a number of states seem to indicate that we have the essential conditions for the production of Fennel, Caroway, Coriander, Angelica and other aromatic plants. With the war in Europe it is believed that economic conditions are right for the promotion of the cultivation of many aromatic plants in the United States.

Since the first world war there have been some outstanding developments in the volatile oil industry. Russia now produces several hundred thousand acres of oil bearing plants annually, an industry developed within the last twenty years. Hungary developed a large oil industry from the cultivation of flowers, since the first world war. At present there is considerable activity in Palestine; in central Africa under the British and in South America.

In the United States the only important essential oils produced are Oils of Sassafras, Peppermint, Spearmint, Wormwood, Wormseed, Orange, Lemon and Turpentine. The production of Oils of Lemon and Orange on a large commercial scale is probably the most outstanding development of this kind for many years. Until very recent years all Oil of Lemon and Oil of Orange were imported, today however, the situation has changed and the great bulk of our domestic requirement is supplied by the California producers.

Of considerable interest to the various industries, especially the cosmetic and soap industries, has been the development of artificial oils. It is almost impossible to keep up with the developments in this field, so many artificial oils with the odor values of the natural oils having been produced in recent years.

Another serious shortage is that of natural gums. Most of the gums imported come from regions within or close to the war zone and the blockade has produced a serious situation. For some time chemists have been working on a new line of gum substitutes and products such as pectin, the borates of mannitol and sorbitol and the alginates are now being investigated. It is possible that out of the present war may come an entirely new line of synthetic gums or gum substitutes and in time we may find them replacing entirely, or to a large degree, the natural gums.

In closing may I say that the shortage in crude drugs will become more serious within the next six months. We may be able to produce a limited quantity of some of the most essential drugs within the next year but some important drugs can not be produced because we lack suitable facilities.

In the meantime we may, where possible, encourage the use of suitable botanicals of American origin. Where we know of no suitable substitutes, other drugs having similar properties may be employed or we may have to wait for the synthesis of entirely new compounds.

To say the least we can anticipate changes of a considerable degree in the pharmaceutical industry—things could not be different in a world which has changed its social and economic order to such a great degree during the last year.

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"Reeling and Writhing and Rhythmatic" seem so often to have replaced the fine trinity of fundamentals in the old program of education. But listen to this:

High school students will add reading—yes, reading!—to their studies, if advice of ten noted educators who have been probing weak spots in American education is followed. Producing competent readers would be a major achievement in educating young Americans, they conclude.

Recommending "radical changes at many points" in high school education in this country, their report to the American Youth Commission of the American Council on Education discloses that many high school pupils read no better than fourth or fifth grade children, and strongly criticizes present methods of teaching young America to read.

# SCIENCE THE HANDMAID OF AGRICULTURE

By T. Swann Harding

Granite Gables, Falls Church, Va.

**Originally one of the minor duties of the Patent Office, the assistance given to agriculture in this country, became so extensive and valuable that it was segregated into a distinct department, and finally, given representation on the President's cabinet. The author presents a most interesting historical sketch of the events and persons concerned with the growth of our present Department of Agriculture, whose service in behalf of the country's welfare has been a large factor in our national growth and prosperity.**

THERE is nothing startlingly new in a world sense about Government aid to agriculture. In his celebrated Travels the indefatigable Marco Polo tells us that the Great Khan provided agricultural relief for his people. He supplied farmers with seed grain when drought or insects had destroyed their crops, and he exacted no tribute from them in bad years. He also established ever-normal granaries of a sort which he filled with grain in times of plenty. This grain was distributed among the people in time of need.

In the United States Government aid to agriculture came somewhat late and in response to pleas made by agricultural societies and individual farmers for many years. Originally an agrarian nation, we began rapidly to become industrialized around the time of the Civil War. Our agriculturalists more and more went into commercial farming. The day of dominant subsistence farming was past. The commercial farmer battled with the elements as a business proposition, and he soon cried for Government aid to equalize this struggle.

Specifically the farmer wanted the organized aid of science to assist him in making two blades of grass grow where but one had grown before. In 1813 Sir Humphry Davy's *Elements of Agricultural Chemistry* had been published as an outgrowth of a series of lectures he was commissioned to give in England by the British Board of Agriculture. The book did much to make intelligent farmers reflect upon the aid science could give them.

George Washington, often called The Farmer of Mt. Vernon in earlier years of the Republic, told both houses of Congress on December 7, 1796, that agriculture was of primary importance to the national welfare. He said: "Institutions for promoting it grow up supported by the public purse, and to what object can it be dedicated with greater propriety?" He suggested the formation of boards

to collect and diffuse agricultural information as a very "cheap instrument of immense national benefit."

According to Commissioner of Patents, William D. Bishop's report for 1859 the Columbian Agricultural Society for the Promotion of Rural and Domestic Economy was founded in 1809 and held the first agricultural exposition in this country at Union Hotel, Georgetown, D. C., May 10, 1810. President Madison is said to have attended this affair wearing his inaugural coat. Prizes of $100, $80 and $60 were offered for "two-toothed ram lambs."

Other Presidents attended later meetings of this organization whose officers sometimes referred to it as "The Board of Agriculture recommended by the Farmer of Mount Vernon." Earlier still there had been intimations of direct Government aid to agriculture when Benjamin Franklin sent home choice seeds and plants from Europe before the War of the Revolution. The Department of State took these in charge and effected their distribution.

In his annual report for 1857 Commissioner of Patents Holt said that the first American farmers were the wives of the Indians. He went on to observe that agriculture had long been encouraged officially by certain European governments and that the legislature of Virginia had promoted the growth of hops as early as 1657 over here. Great Britain also made occasional grants to the Colonies for the stimulation of agricultural production.

In 1817 the Congress granted certain land in the Mississippi Territory to settlers provided they would till it. In 1838 a township six miles square in Dade County, Florida, was granted to Dr. Henry Perrine on the implied condition that he would use it for the domestication of tropical plants. But the enterprise was abandoned at his death the year following.

American agricultural societies had long desired Government aid for farmers. One of the first of these appears to have been the Philadelphia Society for Promoting Agriculture, formed March 1, 1785. Our first agricultural journal appeared some twenty-five or thirty years later. But in 1819 the legislature of New York appropriated $20,000 to be spent over a period of two years to promote agriculture and family or domestic manufacturing. It added another $1,000 for the purchase and distribution of useful seed.

In 1840 Baron von Liebig's *Chemistry in Its Application to Agriculture and Physiology* appeared. This activated much thought among intelligent farmers. The commercial farmer was becoming a

producer who sold at wholesale in a free market and bought at retail in a controlled market. As a commercial enterpriser he felt that he was as much entitled to Government aid as any other producer or manufacturer.

Meanwhile the Federal Government had continued to collect and distribute foreign plants and seeds, though not very effectively. The consular service and the Navy collaborated in securing these and the Patent Office gradually took over the job of their distribution. But the work was not well organized. Letters continually came in asking the establishment of some Government agency to attend this work regularly and also to promulgate agricultural statistics and publish them.

George Washington signed the first patent act April 10, 1790. He himself had urged the passage of this legislation in response to petitions made to the Constitutional Convention by inventors and others. Until 1802 one room at the State Department and one part-time clerk sufficed to attend patent business. Dignitaries like Washington or Jefferson examined models and petitions and signed patents personally.

But the work went on slowly the first few years and as early as 1793 inventor's protests against the patent board system led to passage of a patent registration act. The Secretary of State could not thereafter refuse a patent, and no presumption of its validity had to be established. This system also worked poorly. On July 4, 1836, President Jackson signed the law which established the Patent Office under a Commissioner in somewhat its present form, and provided for close scrutiny and full validation of patents.

The first printed report of the Commissioner appeared in 1837 and was signed by Henry L. Ellsworth. In this and subsequent reports he observed that most of the patents granted were agricultural in nature and that agricultural work took an increasing share of the time of the office—though still more was demanded by the public. In 1839 Commissioner Ellsworth wrote quite a letter in response to inquiries of a Congressional committee, giving full details about the urgency of providing some Government funds in aid of agriculture.

Very soon after the Patent Office received permission to use $1,000 of the fees it collected for the assembling and publication of agricultural statistics and to distribute useful seeds and plants. The day of the happy, independent, subsistence farmer, described by Jeane Anthelme Brillat-Savarin in his *Physiology of Taste* was about

ended. The Frenchman found the American farmer very happy and independent in 1794, but the times changed and the farmer had to change with them.

But even Commissioner Ellsworth remarks in one of his reports that while the husbandryman might get momentarily depressed by the low price of crops, "he is cheered by the reflection that he is better off than those in professions already crowded . . . How much better for the young man of this country to aspire to the enviable rank of a scientific and successful agriculturist, than to grasp at the shadowy honors that are momentarily cast around the brows of political combatants."

Ellsworth's successor as patent commissioner, Edmund Burke, in his annual report for 1848 said that agriculture was "the great transcendant interest of the Union" and that the farmer had "equal reason to console himself with the honorable character and exalted dignity of the pursuit in which he is engaged. No occupation offers a greater field for experiment, and for the application of science directed by sound judgment."

Yet during Ellsworth's time as commissioner cotton growers wrote him lamenting that something must be done about the overproduction of cotton and intimating that without Government aid the growers would soon be ruined. A carryover of 1,300,000 bales loomed by 1846 and it was felt something must be done to avert this calamity.

In his reports Ellsworth had considerable to say about the many labor-saving devices patented which would be of utility to farmers. He noted the rise of horsepower machinery and predicted that steam would soon accomplish still greater marvels of production. He said that in spite of many letters which came to him begging Government aid for farmers, "Husbandry seems to be viewed as a natural blessing, that needs no aid from legislation."

Commissioner Ellsworth argued that, as he saw it, enlightened as he was by his voluminous correspondence, agriculture should not be expected to depend upon Providence for aid, while commerce and manufactures received much assistance from Government in tariffs and otherwise. He was collecting and distributing seeds the best he could, but that compelled him to neglect Patent Office business. A great deal could be done to increase the production of agricultural commodities and the income of farmers if a little Government aid were granted agriculturalists.

During Ellsworth's term of office the Patent Office began the collection and publication of agricultural statistics, and soon agricultural matters occupied most of the space in its annual reports. This continued in the term of Ellsworth's successors. Thus in the report dated April 23, 1852, we find a long account of an address delivered by A. Williams, Esq., when presenting a silver goblet to a Mr. Horner of California for his production of prize vegetables.

The presentation was made in the San Francisco exhibition hall where all sorts of vegetable marvels seemingly confronted the eyes of the speaker, who claimed that the city could raise only one thing better than the rural sections of the State, that being rent. He continued: "I hold in my hand a statement signed by twelve citizens of the County of Santa Cruze." He read their names and then the statement.

These gentry attested that, on land owned and cultivated by Mr. James Williams, an onion grew to the weight of twenty-one pounds, and a turnip "was grown which equalled exactly in size the top of a flour barrel." On the land of Thomas Fallen a cabbage grew that measured thirteen feet and six inches while growing, and various cereal grains sprang up to heights of from six to twelve feet. But let us quote Mr. A. Williams himself:

"Added to these astonishing productions is a beet, grown by Mr. Isaac Brannan, at San Jose, weighing sixty-three pounds; carrots, three feet in length, weighing forty pounds. At Stockton a turnip weight one hundred pounds. In the latter city, at a dinner for twelve persons, of a single potato, larger than the size of an ordinary hat, all partook, leaving at least the half untouched. These may be superlatives, but they do exist, and they show what our soil and climate are capable of producing."

California boosters are nothing new, evidently. Mr. Williams said such production was not unnatural in soil that also produced "gold of every conceivable form and size, from dust up to lumps weighing thirty pounds." He saw before him as he spoke specimens of "Shelton's mammoth clover" with stalks from one root that covered eighty-one square feet, some stalks six feet tall and one-half inch in diameter, and the clover head five inches in circumference. He saw also a red sugar beet grown by L. M. Beard of San Jose, twenty-eight inches in circumference and weighing forty-seven pounds.

He saw before him "baby beets" scarcely two months old, from the gardens of Alderman Green, weighing six or seven pounds; a

cabbage from H. Bolmer's ranch near San Jose weighing ninety-six pounds and seven feet in circumference; cucumbers eighteen inches long; onions weighing three or four pounds each and yielding 70,000 pounds per acre; a potato from B. J. Stevens of Santa Clara which was thirteen inches long, twenty-seven in circumference, and weighed seven and one-quarter pounds; ten-pound bunches of grapes, two-pound tomatoes; 100- to 140-pound squashes and pumpkins, and fifty-pound cabbages in profusion.

But no matter how well California did, other American farmers clamored for Government aid. The Patent Office did what it could. In 1849 it left the State Department to enter the newly created Department of the Interior. In his report that year Commissioner Ewbank wrote:

"Neither the earnest recommendation of the illustrious farmer of Mt. Vernon, nor the prayers of two generations of agriculturalists, nor the painful fact that nearly all tilled lands are becoming less and less productive, could induce any legislature to foster the study of agriculture as a science."

Commissioner Ewbank then made sarcastic reference to the puny grants of a $1,000 a year which, even if most judiciously expended, could scarcely restore fertility to a hundred million acres as impoverished, exhausted soil. He advised that a Government agricultural bureau be set up. So far all aid agriculture received had to be rendered by a temporary clerk in the Patent Office whose salary, with the cost of buying and distributing seeds, came out of patent fees. Surely agriculture had a more important claim on public funds than this.

In 1856 Commissioner of Patents Charles Mason reported that Congress had appropriated $75,000 for agricultural purposes, of which he had at the time an unexpended balance of $24,000. The money had been spent mostly for seed distribution. But chemical analyses and entomological investigations were needed, while many problems concerned with fertilizers, livestock growing and plant adaptation awaited scientific solution.

Mason did not believe that Congressional appropriations for agricultural purposes were a departure from Constitutional warrant, though he did not care to discuss this question at length. It was his duty merely to carry out the wishes of the Congress. Yet it did seem to him that there was as much warrant for public aid to agriculture

as for the establishment by the Government of naval and military academies.

Surely, wrote Mason, thinking out loud, it was as lawful for the Government to promote the arts of peace as those of war. They were quite as germane to the general purposes of Government, quite as useful. Millions of dollars annually were devoted to the encouragement and security of commerce. Was the promotion of manufacturing any more national in scope than that of agriculture. Congress manipulated the tariff to favor manufacturers. Why should farmers be left so largely to their own individual efforts?

This discussion by Commissioner Mason reflected a growing school of opinion which demanded Federal aid to agriculture. In 1860 we find a dignitary designating himself as Superintendent of Agricultural Affairs of the United States writing part of the patent commissioner's annual report. He expatiated on aid to agriculture given by European nations.

He said it was very natural that we had no agricultural department in Colonial times, but in 1860 such a department was urgently needed. It was the Government's duty to take better care of the public domain, for this writer evidently regarded arable land as a public trust. Yet soil exhaustion continued. The use of steam power on farms presented new problems continually. Agricultural societies cried for Government aid, at very least a good chemical laboratory and plant-introduction office.

Commissioner of Patents D. P. Holloway in his report for 1861 continued this discussion. The Civil War was in progress. The problem of food production was serious with so many called to arms. The Southern State-rights delegation to Congress was there no more, and it was they who had so long prevented passage of legislation for Federal aid to farmers.

President Lincoln suggested in a message to Congress that an agricultural bureau be established. On May 15, 1862, he signed the bill providing for this. The former Chief of the Agricultural Section in the Patent Office, the distinguished and learned Pennsylvania farmer Isaac Newton—who as a private citizen had long advocated passage of such legislation—became our first Commissioner of Agriculture.

The Patent Office had already employed agricultural statisticians, an early form of the modern agricultural economist. On August 21, 1862, the first professional employee of the Department of Agriculture

was appointed. He was the chemist, Charles M. Wetherill. In 1863 a regular full-time statistician and an entomologist were appointed. "Nothing is impossible to labor aided by science," wrote Newton, quoting Sir Humphrey Davy.

Newton announced that the immediate objectives of the new department would be: The collection, arrangement and publication of useful agricultural information; the collection and introduction of valuable seeds and plants; the answering of farmers' inquiries and the publication of the replies when it seemed wise; the testing and chemical analyses of fertilizers, seeds, agricultural implements, breeds of animals, soils, plants and agricultural products in general.

There were protests of course. There always are against progress. In 1863 Newton replied to certain people who said farmers merely wanted to be let alone. He thought only ignorant farmers desired no aid. Many of them were still plowing the same stones on the Atlantic seaboard that their great grandfathers had plowed before them. This land, held Newton, should long since have been given over to timber—an intimation of planned land use at an early day.

Newton then observed that farmers had neither time, means nor ability to carry on controlled experimental investigations themselves. Neither could isolated individuals collect, collate and diffuse stores of agricultural knowledge as could the department.

In 1862 Commissioner Newton predicted that this nation would have a population of 100,000,00 before all were dead who read his words. In 1863 he spoke of the Republic as "a mighty giant, resting firmly on the soil and acquiring development and strength by toil." In 1866 the department spent $162,600 and reported an unexpended balance of $85,084.

One day that summer Commissioner Newton sat in his office in downtown Washington and heard a thunderstorm approaching. He remembered that wheat in certain variety tests had just been cut over in a far part of what now is the grounds of the Department of Agriculture building. So he grabbed his hat and rushed over that hot July to superintend the raking and putting under cover of these samples. He stood there supervising the job. The sun bore down upon him in his silk hat and frock coat and he suffered sunstroke. He died a few months later having never regained his health.

It was some years before the Department of Agriculture gained cabinet rank. But between 1880 and 1890 farmers wanted more

scientific aid for agriculture still. The frontier was about gone. By 1890 no more arable public land was given away free. The farmer had to stay put and make his own farm produce; he could not push on to rich lands elsewhere when his soil was exhausted. In 1887 the act founding the State agricultural experiment stations was passed and in 1889 the Department of Agriculture achieved cabinet rank.

The incumbent Commissioner of Agriculture, Norman J. Colman, became Secretary of Agriculture for just twenty-six days until March 7, 1889, when the first presidentially appointed secretary, Jeremiah M. Rusk, took office. He found the building of the department crowded and the records in disorder. He set out to remedy these defects.

Among other things he quickly made press contacts, started a Division of Publications, and saw the importance of getting out information in popular form in the Farmers Bulletin series. He thought it a shocking waste of money and ability if the conclusions of scientific work were not placed quickly before those in need of them. He said that 40,000 letters of inquiry reached the department annually and that his fifty workers could scarcely take care of the departmental duties and functions.

By this time farming was a competitive commercial occupation upon which 30,000,000 people depended, directly or indirectly. Agriculture must be correlated with other industries. The department must continue its present studies and also branch out. It now carried on work in the fields of statistics, botany, vegetable pathology, economic ornithology and mammalogy, miscroscopy, forestry, gardens and pomology. Among its larger units were the Office of Experiment Stations and the full-fledged Bureau of Animal Industry established as such by Congress in 1884.

Rusk concluded his report by saying: "The great nations of Europe strain every effort to make science the hand maid of war; let it be the glory of the great American people to make science the hand maid of agriculture." Will the straining nations of Europe permit us to do that?

# PHARMACY AND PHILATELY

By George N. Malpass

**Before and during the Civil War the feeling between the North and South was manifest in many ways. Not least among these were the designs and caricatures carried on envelopes used in the mails. The author gives examples of some having a pharmaceutical bearing which were used by each side of the argument. These are not only interesting, but now appear quite amusing since all such disunity is now in the dim and distant past.**

PHILATELY, commonly known as stamp collecting, has been aptly called the "Hobby of Kings" and the "King of Hobbies" because it is universal in its scope and so flexible in its practice that it can be applied to any given subject.

In the fullest sense it consists not merely in collecting large numbers of stamps from one or many countries, but of painstaking research into the postal history of the country or period studied, along with the interesting and unforseen developments which usually accompany such original investigation.

What, therefore, is more natural than that the scientist who happens to be addicted to this fascinating hobby should attempt in some manner to link it with his profession?

This has been accomplished to some extent by several who have written articles for the philatelic literature about famous pharmacists and chemists whose portraits appear on stamps.

One prominent scientist delivers a lecture which he calls "Phytophilately," dealing with the drug plants and products which appear on stamps, and here is a wide field for botanizing without having to go outside for specimens.

It is as a collector specializing in the philately of the Civil War period that I ran across a phase of the hobby which should be of interest to all pharmacists.

Shortly before the war between the states, when feeling ran high in both the North and the South, propaganda was disseminated by the use of decorated envelopes bearing patriotic designs and mottoes. There was a wide range of subject, varying from the sublime to the ridiculous, and from historical to hysterical ideas. Many were noble in sentiment, and bore Biblical verses, songs, portraits of famous men, state seals, flags and other patriotic insignia. Others were in

the form of caricatures, showing the evil traits of the "enemy," or lampooning his weaknesses and failures.

These Patriotic Envelopes, as they were called, were issued by a number of private publishers, and appeared on the news stands throughout the country. Comparatively few were issued in the southern states, due to lack of paper and poor printing facilities. There are thousands of known designs, and their study is in itself a gigantic task, as but a small percentage have survived. Many of these covers were printed in color, others were hand tinted, and some are very fine specimens of steel engraving. In many instances the entire envelope was covered by the design, leaving no place for the address. In such cases the envelope was usually turned over and addressed on the reverse side.

There are a few designs that deal with pharmacy, especially in its capacity for making trouble for the rebellious southerners. The following are typical examples:


Fig. 1. Depicts Lincoln in the role of alchemist, preparing "Pure Refined National Elixir of Liberty," and advertising other cures for "rebellious complaints." Note Jefferson Davis and General Beauregard already pickled in the specimen jars. This cover was the subject of a short sketch by D. D. Berolzheimer in the January, 1940, issue of *Industrial and Engineering Chemistry.* It is classified among the rarities and there are only a dozen copies known still to be in existence.


**SECESSION PHYSIC CURE.**

To cure *Secession* and its ills,
Take Dr. Scott's *Cast Iron Pills*;
Well mixed with *Powder* of *Saltpetre*,
Apply it to each "*Fire-Eater*."
With *Union Bitters*, mix it clever,
And *treason* is warned off forever

Fig. 2. Symbolic of General Winfield Scott's ability to administer cannon balls to the South. The powder is obviously gunpowder, and the bottle of Union Bitters a cannon from which to eject the "pills."

Fig. 3. Shows Winfield Scott stirring a dose for his patient, Jefferson Davis, in a mortar. Note the use of substitution (practised even in those early days) of bayonet for pestle, in compounding the mixture.

*J. D. (patient.)* Doctor, I don't know what to think of my disorder. I should call it the *ague*, only the fever came *first*, and now I am shaking in my boots.

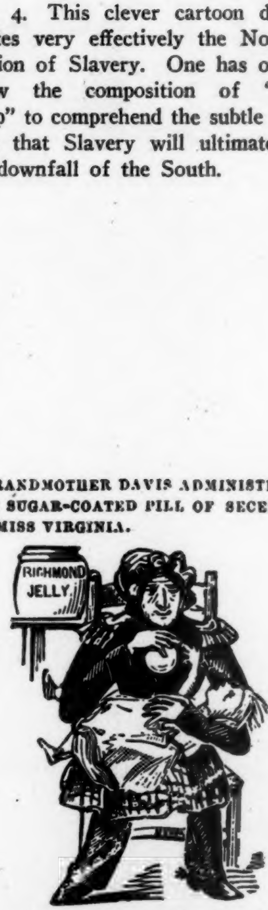
*Dr. Scott.* Well, Davis, you'll find you are too far north. You will have the *shakes* in earnest unless you take some of this *Union Broth* to strengthen you—*you must take it!*

S. C. Upham, 310 Chestnut St.


A popular medicine used by the C. S. A. aristocracy, that cannot be obtained in any Northern apothecary shop, being com-*pound*-ed exclusively on the sacred soil.

Fig. 4. This clever cartoon demonstrates very effectively the Northern version of Slavery. One has only to know the composition of "Black Drop" to comprehend the subtle inference that Slavery will ultimately be the downfall of the South.

GRANDMOTHER DAVIS ADMINISTERING THE SUGAR-COATED PILL OF SECESSION TO MISS VIRGINIA.




*Grand-ma Jeff.*—Now take this, 'Ginny, and I'll give you some *Capitol* jelly.

S. C. Upham, 310 Chestnut Street, Phila.

Fig. 5. This is one of a host of cartoons designed to influence the feelings of the people in border states and sway them to remain in the Union. This shows the efforts of Mr. Davis to win Virginia to the Southern Cause. Even though the sugar-coated pill will be pleasant tasting, it looks as though Miss Virginia will have a difficult time trying to get it past her Adams Apple.

Figs. 6, 7, 8 are self-explanatory.

Entered according to Act of Congress, in the year 1861, by J. E Hayes in the Clerk's Office in the District Court of the District of Massachusetts.

Uncle Sam's Recipe for Traitors.

"TO BE WELL SHAKEN BEFORE TAKEN."

Fig. 6.

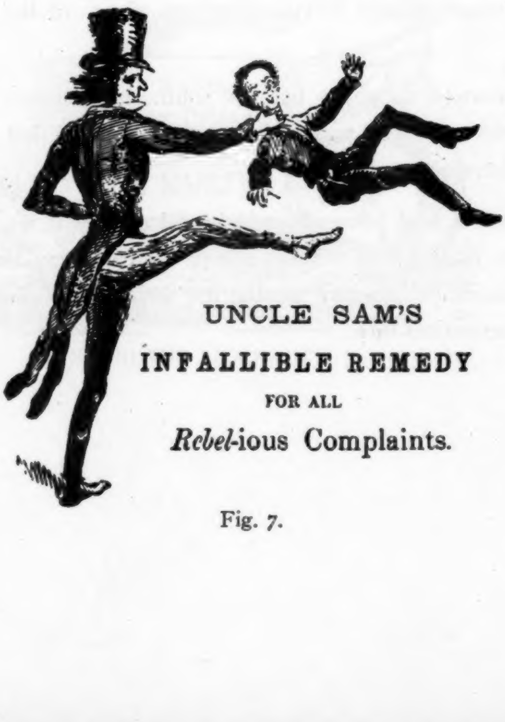
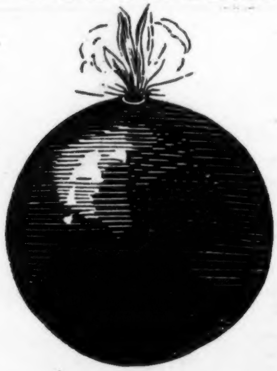



Fig. 7.

TO CURE REBELLION.



**'This is the Pill that will Cure or Kill.'**

Fig. 8.

And now we come to the southern version, for the people of the south were equally adept in ridiculing the efforts of the "Abolitionists."

Unfortunately, there are but few southern patriotics from which to choose, and a diligent search does not reveal any that are directly related to pharmacy.

There are a few, however, which will qualify if we but slightly stimulate the imagination. Who among us can deny that cotton is not a pharmaceutical product, or that the serpent and alligator had no place in alchemistical lore?

C. S. A.

OUR THRONE.
COTTON defeated PACKENHAM. and Cotton will defeat "Ape Lincoln."

Fig. 9. Shows a Southern General safely upheld on his throne of cotton. This same cotton proved a bulwark of defense against the British General Packenham in the battle of New Orleans, and so he believes that it will ultimately prove the downfall of "Ape Lincoln," as a result of the money it will bring after safely reaching the British market.


"RUNNING THE BLOCKADE."

Fig. 10. Ridicules the Northern Blockade, and shows how easily goods are run in and out of the Southern ports.

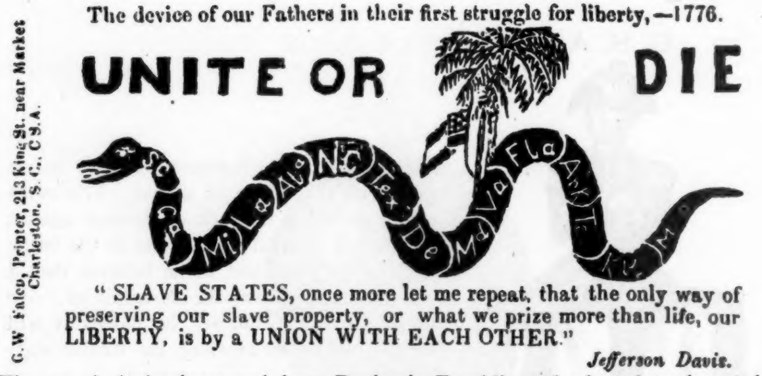



Fig. 11. A device borrowed from Benjamin Franklin and adapted to the needs of the day. Note the palmetto tree, emblematic of the state of South Carolina, first state to secede. In the body of the snake appear the initials of several borderline states which did not actually secede. This was propaganda designed to influence the sadly harassed people in these unfortunate states.


Fig. 12. Under the Stars and Bars and "sitting on top of the world" appears a young Southern Samson squeezing the life out of "Abolition." Practically the same cartoon was also used in the North, under the Stars and Stripes, squeezing the life out of "Secession." So regardless of which side you were on, there was plenty of fun for all.

The interesting letters that accompany many of these envelopes contain messages of hope, despair and stark tragedy, and serve to remind us of the great struggle in which brave men on both sides fought and died, leaving us a heritage that we should cherish above all else—a free and united country.

## OUR CONTRIBUTORS THIS MONTH

**Frank H. Eby, Ph. D.,** is Professor of Botany and Pharmacognosy at the College of Pharmacy of Temple University. An extensive traveler throughout the United States, he has often planned his itineraries to permit the visitation of sections famous for drug plant cultivation. Dr. Eby is a past president of the Plant Science Seminar in which he is an active member.

**T. Swann Harding, B. S.,** a frequent contributor to our Journal and one whose articles are never lacking in interest, is the Editor of Scientific Publications of the Department of Agriculture. The wealth of subject matter at his disposal together with an unusual ability to select and correlate the facts explain in part the unique quality perceived in his writings.

**Geo. N. Malpass, Ph. G., Ph. C.,** is an ardent philatelist, being one of the few members of the Confederate Stamp Alliance as well as president of the stamp club of his home city. He is associated with the Upjohn Company at Kalamazoo and was formerly a faculty member of the Philadelphia College of Pharmacy and Science.

# ABSTRACTS SELECTED

From Current Literature of the Sciences Supporting Public Health

**The Survival Rates of Streptococci Exposed to Natural (Daylight and Sunlight) and Artificial Light in Simulated Room Environments.** Buchbinder, Solowey and Phelps. *J. Bacteriology 41,* 1, 79 (1941). The survival rates of streptococci that were variously illuminated (daylight, sunlight, and artificial light) in simulated room environments were studied. Daylight on clear or cloudy days was found to be a potent lethal agent for streptococci. Its effect was to multiply by 2 to 4 times per foot-candle of illumination the death rates obtained in the absence of light. The 50 per cent. survival time of a strain of α-hemolytic streptococci was 40 minutes, while that of a strain of β-hemolytic streptococci (group A) varied from 1.5 to 6 hours. Sunlight was much more bactericidal than daylight, e. g., the 50 per cent. survival time of the α-hemolytic streptococci was 5 minutes. The lethal power of sunlight per foot-candle was of about the same order as that of daylight, being much lower than that from blue skies and somewhat lower than that from gray skies. Artificial illumination from a fluorescent lamp was less lethal per foot-candle than daylight, but about as effective as sunlight. The practical value of this finding is questionable because of the low intensities employed.

B. W.

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**Certain Antibacterial Properties of Saliva and Tears Not Due to Lysozyme.** R. Thompson. *J. Bacteriology 41,* 1, 77 (1941). In acid solutions lysozyme is heat-stable and readily filterable. It was of interest to determine whether the antibacterial principles of saliva and tears active against certain organisms other than the lysozyme-sensitive saprophytes also survived heating or filtering in acid solutions.

In acid solutions the lysozyme of human saliva resisted 100° C. for five minutes and passed readily through Mandler filters, but the agents responsible for the inhibition of diphtheria bacilli, lactobacilli, hemolytic streptococci, and staphylococci were destroyed. In acid solutions the lysozyme of human tears resisted 100° C. for five minutes, but the agent causing the inhibition of staphylococci was destroyed.

B. W.

**Your Skin Resurfaces Your Body to Protect It From Infection and Injury.** J. W. Williams. *J. Bacteriology 41,* 1, 73 (1941). Changes in outer, insoluble, keratinized epidermis, compared with growth in shake culture and on slants, show that the concentration of constituents, decreased available nutrient, compactness, insolubility and low pH discourage the growth of micro-organisms and their invasion. The skin continuously resurfaces to maintain the above conditions. Beckman potentiometric readings of the volar surface of the forearm, using a special platinum electrode, show the normal skin to vary from pH 4.5 to 5.5, and Eh from 0.5 to 1.5 v. Injured or infected skin display higher pH and an Eh from 0.2 to — 0.02. More acute lesions show a lower Eh. Cold applied to the skin increases, heat lowers the Eh. Increased alkalinity of the skin surface (Green soap) result in lower Eh, a greater infectivity or growth of the organisms, and a greater ease of hydrolysis. The skin reacts to prevent this. Its lower, more alkaline, reduced layer is protected by a superficial, more acid, oxidized layer until injury. If pathogens are present in the lower skin layer growth may be expected if the body is unable to resist. These factors are probably operative to some degree in the prevention of surface growth on meats, since oxidation and/or acidity and/or oxygen penetration are increased when carbon dioxide, ozone, ultraviolet radiation or cold are used. B. W.

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**A Method for Determining the Hardness of Agar.** A. F. Roe. *J. of Bacteriology, 41,* 1, 48 (1941). An apparatus for evaluating the hardness or turgidity of agar is employed for measuring the pressure (in mm. of mercury) required to force a cylinder of agar through a fine mesh screen under conditions sufficiently standardized to permit duplication. Some of the conditions found necessary to control were: the rate of temperature change from the liquid phase (solution of agar in water) to the solid phase (solution of water in agar); the temperature of testing; the pH; the concentration of the salt, etc. B. W.

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**Action of Synthetic Detergents on the Metabolism of Bacteria.** Z. Baker, R. W. Harrison and B. F. Miller. *J. Exp. Med. 73,* 249 (1941). The bactericidal and bacteriostatic actions of soaps have been recognized for many years. Their selective germicidal action, their alkalinity, and their precipitation by hard water limit their

usefulness. The synthetic detergents, developed by industrial demand, are in most cases superior to soaps in wetting and cleansing abilities and have the additional virtue of stability in acid and alkaline solutions. They may be classed into three groups: anionic compounds, cationic compounds, and non-ionized compounds. The biological effects of certain of these have been investigated by several workers and their results are briefly noted in this paper. The desirability of a more detailed investigation has led the authors to study the effects of synthetic detergents and wetting agents on the respiration and glycosis of Gram-positive and Gram-negative micro-organisms. The preparation of the bacterial suspensions, the manometric technique, and the sources of the micro-organisms are described in detail. For the detergents employed there is presented a table which gives in each case the trade name, the chemical structure, and the manufacturer, and which groups them as cationic or anionic. The detergents were used in concentrations of 1 : 3000 and 1 : 30,000.

The cationic detergents were found to effectively inhibit the metabolism of both Gram-positive and Gram-negative micro-organisms equally well. The anionic detergents inhibited only the Gram-positive micro-organisms and were considerably less active than the cationic compounds. Certain detergents stimulate bacterial metabolism when used in concentrations lower than the inhibiting values. This effect has been found more frequently among the anionic detergents. On varying the pH, the maximum inhibitory action for the cationic detergents was found to be on the alkaline side, and for the anionic detergents on the acid side. In a homologous series of straight chain anionic alkyl sulfates and sulfoacetates the maximum inhibition was exerted by the 12, 14, and 16 carbon compounds (lauryl, myristyl, and cetyl) on Gram-positive micro-organisms. A homologous series of cationic compounds was not available, but the powerful inhibitory activity, demonstrated here probably for the first time for a non-quaternary ammonium compound, of the lauryl esters of amino-acids, was enhanced by increasing the length of the amino acid portion of the molecule. All of the above results are presented in several tables.

From these investigations the authors indicate that it is likely that compounds which inhibit the metabolic processes of bacteria would also act as germicides, although they say exceptions should be expected. The possibility of the existence of relationships between the characteristics of the detergent and its inhibitory capacity are discussed. The importance of solubility, and hydrophylic-hydrophobic

balance and the presence of specific chemical groups in the detergent molecule are also pointed out. Various explanations of the detergent germicidal mechanism are considered. The authors express the hope that an insight into the difference between Gram-positive and Gram-negative micro-organisms may be supplied when the mechanism of the action of the synthetic detergents on bacteria is elucidated.

W. T. F.

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**Using Gelatin as a Stabilizer in Emulsion Systems.** L. F. Tice and K. W. Percival. *Amer. Perfumer & Ess. Oil Review 42,* 51 (1941). Emulsion flavors have attained a position of importance in the food industries as shown by Redgrove (*Am. Perfumer & Ess. Oil Review 40,* 45, (1940)). He suggests that "there is here a field for further research having as its object the production of tasteless and flavorless edible emulsifying agents for the production of emulsion flavors." At the present time the almost prohibitive tax on alcohol for use in the preparation extracts gives added importance to such products.

Tice and Percival have developed formulas for such products. It is pointed out that two types of gelatin are obtainable, one, Pharmagel A, is prepared from an acid-treated precursor and has an iso-electric zone of pH 7.5-8.0; the other, Pharmagel B, is prepared from an alkali-treated precursor and has an iso-electric point of pH 4.7. Only the latter is compatible with tragacanth, which is used as a thickener to lessen the creaming tendency experienced with gelatine emulsions. A working formula for a lemon oil emulsion is presented:

Part 1. Lemon oil, 5 oz.; hot distilled water, 2 oz.; pharmagel B, 0.15 oz.; cold distilled water, 8 oz.; solution of sodium hydroxide (10 Gm/100 cc.), 0.3 cc.

Part 2. Alcohol (95 per cent.), 10 oz.; powdered tragacanth, 2 oz.; solution of citric acid (50 per cent.), 0.3 cc.; water, 73 oz.

Dissolve the gelatin in the hot water, add the cold water and the solution of sodium hydroxide (to give pH of approximately 8). Add the lemon oil and agitate until thoroughly mixed. Now homogenize until the size of the oil particles is 2-4 microns.

Suspend the powdered tragacanth in the alcohol and add with stirring to the water. Add the emulsion prepared in part 1, the citric acid and color if desired. Stir until smooth and homogeneous. The finished product should have the consistency of a heavy cream. The

product is said to be stable with no tendency to develop a terebinthinate odor. Upon dilution with syrup or water a fine permanent "cloud" is produced.

This method is applicable to almost any flavoring oil and should prove of interest to the food and beverage industries. E. E. L.

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**Incidence of Fungi in Cutaneous Eruptions.** J. G. Downing, B. Merrill and D. L. Belding. *New England Jour. of Med. 222,* 263, (1940). The authors found that of 476 patients with cutaneous eruptions 37 per cent. were due to fungi. Culture and microscopic examination were employed. The most commonly found genera were *Microsporon, Monilia* and *Trichophyton.* Most of the conditions due to fungi were found during warm weather.

The head showed the greatest number of lesions with fungi (29 per cent.) with the upper and lower extremities next (26 per cent. each) and the body the least (19 per cent.).

It is believed that diagnosis and treatment of cutaneous infections is greatly facilitated by a study of mycology. M. O. H.

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**Prophylactic Use of Sulfanilamide to Control Postoperative Infection of the Urinary Tract.** J. L. Emmett and H. J. Hammer. *Proc. Staff Meet. Mayo Clin. 15,* 801 (1940). One of the most aggravating complications that follows general surgical procedures is infection of the urinary tract. This usually occurs as a result of urethral catheterization frequently required due to inability of the patient to empty the bladder following operation.

This study covering a period of nine months investigated the use of sulfanilamide as a routine procedure in operations involving the region of the pelvis to determine whether subsequent urinary infection could be prevented. On the day of the operation 200 cc. of an 0.8 per cent. solution of sulfanilamide was given subcutaneously. This was repeated daily until the patient could tolerate tablets by mouth, at which time the subcutaneous administration of the drug was stopped and the patient given 15 grains daily by mouth in divided doses of 5 grains each. In most cases oral administration could be

begun on the third postoperative day. If catheterization had not become necessary by the end of the fourth postoperative day the drug was discontinued, whereas if it was necessary sulfanilamide was continued.

All patients who were subjected to postoperative catheterization had a centrifuged catheterized specimen of urine examined microscopically and cultured. The efficacy of treatment was based solely on the amount of pus found by microscopic examination. The treatment could not be expected to maintain a completely sterile urine but only to prevent the occurrence of severe postoperative infections. Thus the term urine negative was employed for those cases in which the sediment after centrifugation contained only 0-10 pus cells per high power field.

In a total of 197 cases complete treatment reduced postoperative urinary infection from 72.5 per cent. in the untreated cases to 25 per cent. in those treated. Incomplete or sporadic treatment was not nearly as effective. L. F. T.

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**A New Therapeutic Product (Sulfonamide E. O. S.) of the Sulfanilamide Class.** A. G. Green and M. Coplans. *J. Soc. Chem. Ind.* 59, 793 (1940). One of the findings with respect to the physiologic effects of certain chemical groupings is that a high degree of toxicity is frequently associated with the presence of strongly basic groups and that a diminution of this toxicity occurs when the basicity of the compound is reduced; thus the toxic base phenetidine is converted into the useful drug phenacetin by acetylation. This principle of detoxification has been applied to many substances notably the dyestuffs.

Working along this same approach, the authors have prepared the N-ethyl sulfonate of sulfanilamide by heating sulfanilamide with an aqueous solution of sodium acetaldehyde bisulfite. This compound was found to be far less toxic than sulfanilamide and largely free from the unpleasant effects of this drug. Its high solubility permits the preparation of solutions up to 40 per cent. concentration. Clinical tests to be published elsewhere have indicated excellent effectiveness as well as a remarkable freedom from toxicity. L. F. T.

# SOLID EXTRACTS

**Prepared for the readers of the American Journal of Pharmacy by the Editor and his staff**

Since Roentgen accidented upon that inquisitive ray, the X-ray, some few years ago, its applications to many fields of human endeavor have indeed diversified. At first only of value in picturing bone fractures, it is now ***diagnostic*** of disease in the softer tissues, to say nothing of its use and worth, when greatly intensified, in the treatment of malignancies, etc.

But its use in industry has grown apace. It has really gone into business in a big way. For instance, an X-ray machine mounted on a truck peers into telegraph poles where they stand, determines their condition, and thus saves the company a lot of poles and a lot of money.

Citrus fruit growers use 100 X-ray machines to sort their crop. With them, after one severe frost, California salvaged 2,000,000 boxes of oranges which would have been condemned by ordinary methods. The machines had cost $250,000; the oranges they saved for market brought $7,500,000.

Peanuts coming into the packing plant bring with them pebbles and lumps of dirt. Neither screens nor the electric eye could detect them all, but the X-ray spots them. Makers of chewing gum, candy, and tobacco now use it similarly to detect foreign substances.

Firestone Tire and Rubber Company X-rayed the tires on 100 cars chosen at random, found nails or bits or glass imbedded in 99 per cent. of them. Fabric breaks, good for eventual blow-outs, also showed up. Now service stations are installing X-ray, which is cheaper and better than demounting tires and inspecting them by sight and feel.

And here are some more industrial applications of this useful piece of invisibility dedicated to making things more visible:

Five thousand stores fit shoes by X-rays, at least one manufacturer designs his shoes with the help of the machine. Golf balls are

X-rayed to be sure the core is in true center, otherwise the ball will be erratic in flight.

In testing metals, X-ray shows up interior bubbles and cracks otherwise never suspected until some machine smashes up under stress. All airplane parts subject to strain are X-rayed. Navy inspectors, X-raying a turbine for a destroyer, discovered that a contractor had filled a crack in a casting with a metal plug and hidden the trick with a plating of metal. All steam tubing for warships is examined by X-ray; bursting steam lines might cripple a ship in action, mean horrible death for men below decks. One of the biggest jobs ever tackled, speaking of sheer physical dimensions, was the examination of eighty miles of welds on Boulder Dam pen-stocks.

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*In these days of dust storms, drought and soil erosion, we might well look to something of the art of the ancients. Thus think of Theodosia. This city, a Black Sea port on the southeast of the Crimea, obtained sufficient water for a flourishing city by erecting, on the nearby heights, great piles of broken stones upon which the moist breezes from the sea would condense some of their water. Thirteen of these piles, connected with the city by a system of sandstone pipes, supplied 16,000,000 gallons of fresh water daily and permitted Theodosia to become the most important port on the north coast of the Black Sea.*

*Barbaric conquerors permitted the stone piles to become overgrown with vegetation, which destroyed their effectiveness. It was not until the later nineteenth century that the purpose of the piles was again learned and efforts made to restore them to usefulness. Modern engineering methods were not, however, immediately successful in duplicating the empirical work of the original builders; one attempt to do so failed and thereafter political conditions prevented further efforts.*

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A South Philadelphia doctor some few years ago achieved some considerable reputation, and wherewithal, treating arthritic patients with stinging bees. The story goes that he had a technique all his own for rearing bees that knew how to ply their needles, and his patients were actually stung by living bees wherefrom came the curative venom.

Today, however, the bee-venom is obtainable and is employed in either the injection or inunction. The average amount of venom obtained from a single bee varies from 0.15 to 0.3 milligrams. It is a

clear, water-soluble liquid, giving an acid reaction and destroyed by alcohol. Formic acid is not the "active" principle as previously had been supposed, but a complex organic compound containing lecithin and an albumin-free sapotoxin. It is standardized on the basis of the neurotoxic action upon the white mouse.

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*With some cigarettes, especially those featuring mildness, it is no longer a matter of "my lady nicotine." She has a brand new name. It is nornicotine.*

*A U. S. Department of Agriculture chemist has discovered that in certain modern tobaccos, bred for many years to reduce their nicotine content, the predominating alkaloid is now no longer nicotine but a chemically related compound, nornicotine. Tried out on laboratory animals, nornicotine proves to have a much weaker toxic effect. In one case it was only a tenth as poisonous as a comparable dose of nicotine.*

*Tried out in a limited way as an insect poison, nornicotine is fully as effective as nicotine, and in certain combinations even more so. Larger scale tests of this relatively little known compound may now be made, since a possible bulk source of it has been discovered.*

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This is a new one, and suggests fifth column activities in the world of bacteria.

A chemical structurally similar to sulfanilamide and needed by germs for their nutrition has been identified as p-amino benzoic acid. This chemical has been found capable of checking the germ-stopping action of sulfanilamide.

The theory is that the two compete for the same single position of attachment to the bacterial cell. If this theory proves correct, it suggests that chemists should be able to make other compounds sufficiently similar to compounds needed by bacteria to fool the latter into taking them instead of the ones they need.

For applying the fifth column strategy to cancer, Dr. Lockwood of the University of Pennsylvania points out that cancer is "a disease in which unrestrained proliferation of tissue cells is similar in some respects to the proliferation of bacteria in invasive infections.

"If the difference between malignant cells and normal cells should be found to be due to the local activity of some chemical growth factor, a compound of similar chemical configuration might be administered to cancer patients which would block the activity of the proliferative factor without exhibiting its physiological effects."